# Operating instructions

fimotec – fischer
Montagetechnik

## TSM-11 hopper call-up control

**Art. no.: 90.0010.50**

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# Information and explanations

## Target group

These operating instructions will help you to use the described product safely and as intended.– **They are directed toward qualified skilled personnel*.**

*Qualified personnel are people who have been authorized by persons responsible for the safety of the system to execute the required activities and are able to recognize potential dangers and avoid them based on their training, experience and instruction, as well as their knowledge of standards, regulations, accident prevention regulations and operating conditions (definition of skilled personnel according to IEC 364).*

- Read these operating instructions before you install the device, use it or carry out work on it.
- Also pass on these operating instructions to other users.

## Definition of the warnings and symbols

Warnings are indicated by danger symbols and signal words. The table shows what hazards and possible consequences the symbols, signal words and colours indicate.

| Signal word | Definition | Consequences |
|---|---|---|
| ⚠ GEFAHR | Directly threatening danger | Death or extremely serious injuries |
| ⚠ WARNUNG | Dangerous situation | Potential death or extremely serious injuries |
| ⚠ VORSICHT | Dangerous situation | Minor to moderately serious injuries |
| *ACHTUNG* | Risk of property damage | Damage to the machine, its environment and the product |
| | Warnings can also have other warning signs:<br>Example: Warning of electrical current!<br>These symbols indicate the type of hazard. | |

## Term definitions

| Term | Definition |
|---|---|
| User | Persons who use the device installed by the manufacturer in its ready-to-use version. |
| EMC | Electromagnetic compatibility with electrical and electromagnetic influences. |
| Skilled personnel | Qualified personnel with the appropriate education, training and experience. |
| Device | Designation for the hopper control TSM-11 in these operating instructions. |
| Machine manufacturer | Persons who install the device in the intended construction (machine) and who manufacture the ready-to-use version. |

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# 1 Product overview

## *1.1 Scope of delivery*

- TSM-11 hopper control
- Operating instructions

## *1.2 Properties*

### 1.2.1 General

- Mains switch
- Consumer output for 230 V AC condenser motor
- Setting the parameters via DIP switches and trimmers
- All connections have a pluggable design.
- Type of protection IP54

### 1.2.2 Output data

- Consumer output 230 V AC, max. 3 A
- PNP output (hopper filling level check) 24 V DC
- Potential-free output (malfunction) 230 V AC / 6 A

### 1.2.3 Inputs

- Sensor input, level sensor
- Sensor input, filling level check, hopper
- Potential-free input, control disable

# Safety information

## *1.3 Intended use*

The TSM-11 device is a piece of electrical equipment intended for use in supply mechanisms or automation systems. The device is designed for regulating and controlling hopper systems.

The electrical components listed here are called "devices" in the industrial parlance, but are not devices which can be used or connected or machines in the sense of the "Device safety law", the "EMC law" or the "EC Machinery Directive", but components. Only when these components are integrated in the construction of the machine manufacturer is the ultimate mode of operation defined.

The machine manufacturer is responsible for making sure that the construction meets the existing legal regulations.

## *1.4 Basic safety information*

The following warnings both serve for the personal safety of the user as well as the safety of the described products and the devices connected to them.

Non-observance can lead to death, serious bodily injury or property damage.

| | |
|---|---|
| **DANGER**<br> | **Life-threatening danger due to electric shock!**<br>– Disconnect the device from the supply voltage before any intervention.<br>– Before opening the device, wait for at least 30 seconds until the residual voltage has dissipated.<br>– Check to make sure there is no voltage before any intervention. |

- Only skilled electricians may work on electrical equipment.
- Before commissioning, make sure that the voltage supply agrees with the nominal values of the device.
- Check the electrical equipment of the machine regularly. Deficiencies, such as loose connections, damaged or scorched lines, must be fixed immediately.
- Observe the valid accident prevention and safety regulations for your application.
- In particular, observe both the general and the regional installation and safety regulations for working with dangerous voltages (e.g. EN 50178) as well as the regulations having to do with the proper use of tools and the use of personal safety equipment.
- The Emergency Stop mechanisms must remain in effect in all operating modes. Unlocking the Emergency Stop mechanisms must not result in uncontrolled reactivation.

### 1.4.1 Transport and storage

Problem-free and safe operation of this device require proper transport, storage, setup and installation, as well as careful operation and maintenance.

The device must be protected against mechanical impacts and vibrations during transport and storage. Protection against moisture, water and impermissible temperatures (see chapter 4Technical data) must also be guaranteed.

# 2 Installation

| ATTENTION | If the device is not correctly connected, this can lead to the failure or complete destruction of the device (and the connected load). |
|---|---|

## *2.1 Hardware installation*

The TSM-11 is a device for installation outside of a control cabinet and has IP54 protection.

The device can be installed in any position.

Mains connection
The mains must be connected according to the valid regulations.

The connection is made via terminal "**X10**".

The pin assignments are as follows:
**Pin 1** 230 V AC
**Pin 2** N Neutral conductor
**PE** Connection for the ground protection conductor

Here, make sure that L, N and PE are correctly allocated, since otherwise, the main voltage could be connected to touchable parts of the circuit (for a connection diagram, see chapter 6 "Pin assignments") or the device could be destroyed.

All touchable, electrically conductive housing parts must be grounded according to the valid regulations.

The connection must be made with at least a 0.75 mm² line cross-section.

## *2.2 Motor connection*

The connection is made via the Hirschmann GDM3011 plug, which projects out of the X11 screw connection.

The pin assignments are as follows:

**1** N
**2** L
**3** N via condenser
**PE** Connection for the ground protection conductor

The 230 V AC motor is connected to this connection.

## *2.3 Fuse protection*

The fuse protection on the primary side depends on the line cross-section. However, it must be designed to have a B6 line protection switch at minimum.

The devices are also protected with internal fuses.

| | |
|---|---|
| Consumer output | 3.15 A, slow-blow |
| Control electronics | 200 mA, slow-blow |

**Caution!:**
Leakage currents against PE might occur due to EMC-related suppressor components. These are harmless, however, when an industry-standard RCD switch is used with a tripping current of 0.3 A.

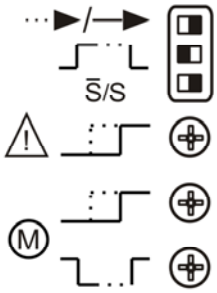
# 3 Operation

The device is set via DIP switches and trimmers. These are located directly under the front cover.

## *3.1 Hopper belt*

**General**

The workpiece in the area around the oscillating shell is detected via a sensor. If no workpiece is detected by the sensor, the hopper control switches the drive on for the hopper belt.
Various functions are available for the drive:




| Symbol | Function | Designation | |
|---|---|---|---|
| ···▶/—▶ | Drive mode | DIP switch, left:<br>DIP switch, right: | Drive runs continuously.<br>Drive runs on and off in a cycle. |
| ⌐¨¨¬ | Drive switch-on time | DIP switch, left:<br>DIP switch, right: | Drive (clock mode) switch-on time 1 s.<br>Drive (clock mode) switch-on time 2.5 s. |
| S/S | Sensor input | DIP switch, left:<br>DIP switch, right: | Sensor input signal (level sensor) N.O. **not inverted**<br>Sensor input signal (level sensor) N.C. **inverted** |
| ⚠ ⌐¨¨¬ ⊕ | Malfunction $t_{malfunction}$ | Trimmer: | Switch-on delay malfunction 35…180 s. |
| Ⓜ ⌐¨¨¬ ⊕ | Switch-on delay $t_{belt}$ | Trimmer: | Switch-on delay sensor signal (level sensor) 0…45 s. |
| Ⓜ ⌐..¬ ⊕ | Drive pause tpause | Trimmer: | Pause drive (clock mode) 0.5…15 s. |

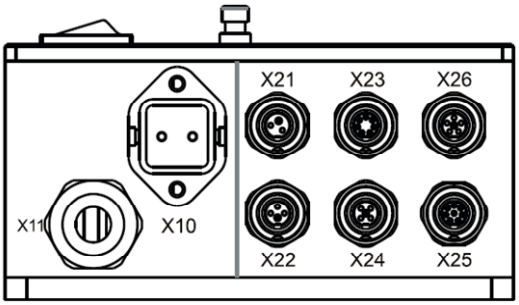
**Drive runs continuously:**

The level sensor does not detect a workpiece in the subsequent machine and switches the drive on after the time $t_{belt}$ has elapsed.
The drive runs until the level sensor detects a workpiece and switches off the drive.

**Drive runs cyclically:**

The level sensor does not detect a workpiece in the subsequent machine and switches the drive on after the time $t_{belt}$ has elapsed.
Drive switch-on time 1 s or 2.5 s, pause time $t_{pause}$ 0.5…15 s.

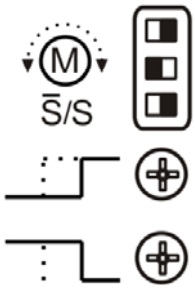
**Malfunction:**
After the switch-on delay $t_{belt}$ has elapsed, the switch-on delay of the malfunction $t_{malfunction}$ starts. If the level sensor is not actuated by a workpiece, $t_{malfunction}$ runs off and the drive is switched off. The potential-free contact for the malfunction is actuated.
The malfunction is acknowledged with the reset button on the front panel.




| Plug connection | Designation | |
|---|---|---|
| X22 | Level sensor | 1: +24 V DC<br>2: 0 V<br>3: Signal |
| X21 | Control disable | 1:+24 V DC<br>2:Signal |
| X23 | Malfunction | 1: Changer<br>2: N.C.<br>7: N.O. |

## *3.2 Hopper filling level check*

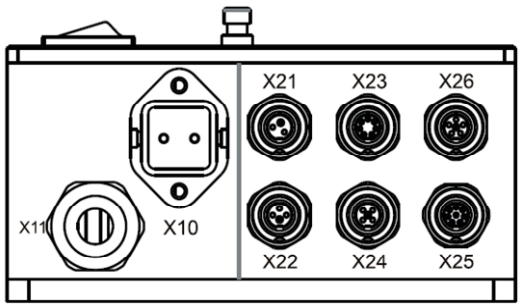
**General:**
The filling level in the hopper can be monitored with the filling level check.




| Symbol | Function | Designation | |
|---|---|---|---|
| M | Direction of rotation | DIP switch, left:<br>DIP switch, right: | Drive direction of rotation clockwise.<br>Drive direction of rotation counterclockwise |
| S/S | Sensor input | DIP switch, left:<br><br>DIP switch, right: | Sensor input signal (filling level sensor) N.O. **not inverted**<br>Sensor input signal (filling level sensor) N.C. **inverted** |
| | Switch-on delay $T_{on}$ | Trimmer: | Switch-on delay, filling level 0…20 s. |
| | Switch-off delay $t_{off}$ | Trimmer: | Switch-off delay, filling level 0…20 s. |

Switch-on delay
The filling level in the hopper is monitored with a light barrier. If a lack of workpieces is detected by the sensor, the switch-on delay $t_{on}$ starts. After this time elapses, the lack of workpieces output is actuated.

Switch-off delay
Once the lack of workpieces in the hopper has been rectified, the output is reset via the adjustable switch-off delay $t_{off}$. The lack of workpieces output drops out.



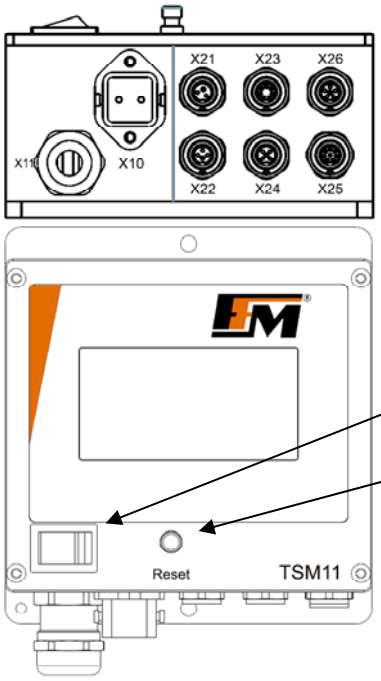

| Plug connection | Designation | |
|---|---|---|
| X24 | Filling level sensor Receiver | 1: +24 V DC<br>2: 0 V<br>4: Signal |
| X25 | Filling level sensor Transmitter | 1: +24 V DC<br>8: 0 V |
| X26 | Lack of workpieces | 1: Signal<br>5: 0 V |

# 4 Technical data

| | |
|---|---|
| Supply voltage: | 230 V AC<br>*(other voltages possible after consultation)* |
| Supply voltage tolerance: | ± 10 % |
| Mains frequency: | 50 Hz<br>*(other frequencies possible after consultation)* |
| Consumer output current | max 3 A |
| Consumer output voltage: | 230 V AC |
| Level sensor [E] | 24 V DC / 50 mA |
| Disable [I] | N.O. contact, potential-free contact load 24 V DC |
| Malfunction [O] | Changer, potential-free contact load 230 V AC / 6 A |
| Filling level check, light barrier [I] | 24 V DC / 50 mA |
| Filling level check, signal lamp [O] | 24 V DC / 80 mA |
| Lack of workpieces [A] | 24 V DC / 50 mA |
| Type of protection: | IP54 |
| Permissible ambient temperature | 5°C to 45°C |
| Permissible relative humidity | max. 95 %, non-condensing. |
| Dimensions: | (h)115,25 mm x (w)125 mm x (d)58 mm |
| EMC | Interference emissions and noise immunity in acc. with **EN 61000-6-x**<br><br>Noise immunity in acc. with **EN 61000-4-x**<br>*Electrostatic discharge strength (ESD)* ***IEC / EN 61000-4-2***<br>*HF irradiation* ***IEC / EN 61000-4-3***<br>*("Burst")* ***IEC / EN 61000-4-4***<br>*("Surge")* ***IEC / EN 61000-4-5***<br>*HF current infeed* ***IEC / EN 61000-4-6***<br>*Voltage drop, voltage interruption* ***IEC / EN 61000-4-11*** |

# 5 Terminal assignments

| **ATTENTION** | If the device is not correctly connected, this can lead to the failure or complete destruction of the device (and the connected load). |
|---|---|

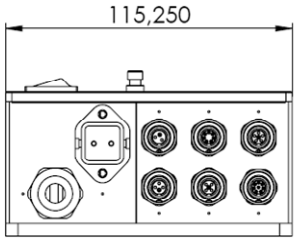


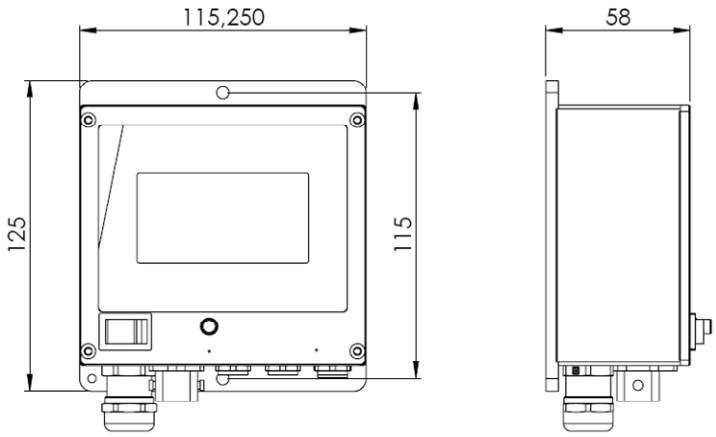

| Plug connection | Designation | |
|---|---|---|
| X10 | Mains feed | 1: 230 V AC<br>2: N<br>PE: Protective ground conductor |
| X11 | Load output | 1: N<br>2: L<br>3: N condenser<br>PE: PE |

Mains switch illuminated

Acknowledge malfunction reset

# 6 Dimensions



# 7 Maintenance and care

## *7.1 Regular tests*

The devices are usually maintenance-free. The electrical equipment of the machines are still to be checked regularly by skilled electricians.
If it's dirty, clean the touchscreen with a conventional window cleaner and a soft, lint-free cloth.

## *7.2 Decommissioning and disposal*

The device is to be decommissioned by skilled electrical personnel while complying with the valid safety regulations.

The packaging of the converter can be recycled. Please keep the packaging for later use.

Easily removable screw connections allow the device to be disassembled into its components. These individual components can be recycled. Please carry out disposal in agreement with the local regulations.

Problematic materials must not be thrown away in the normal waste!
Dispose of problematic materials properly, safely and in an environmentally-friendly manner.

# 8 Accessories and options

## *8.1 The plug connectors listed below are available as accessories:*

| Function | Slot | Article number |
|---|---|---|
| • Level sensor connection | X22 | 91.3300.80 |
| • Disable connection | X21 | 91.3300.70 |
| • Malfunction connection | X23 | 91.3301.10 |
| • Filling level sensor, receiver connection | X24 | 91.3300.90 |
| • Filling level sensor, transmitter connection | X25 | 91.3301.20 |
| • Lack of workpieces connection | X26 | 91.3300.10 |
| • Mains supply line connection | X10 | 91.3301.30 |

## *8.2 The connection lines listed below are available as accessories:*

| Function | Length, line | Slot | Article number |
|---|---|---|---|
| • Level sensor connection | 0.6 m, straight socket | X22 | 91.4200.01 |
| • Level sensor connection | 0.3 m, angled socket | X22 | 91.4200.02 |
| • Level sensor connection | 0.6 m, angled socket | X22 | 91.4200.03 |
| • Level sensor connection | 0.4 m, angled socket | X22 | 91.4200.04 |
| • Level sensor connection | 0.8 m, angled socket | X22 | 91.4200.05 |
| • Level sensor connection | 1.0 m, angled socket | X22 | 91.4200.06 |
| • Level sensor connection | 2.0 m, angled socket | X22 | 91.4200.07 |
| • Level sensor connection | 5.0 m, angled socket | X22 | 91.4200.08 |
| • Filling level sensor, rec. connection | 0.7 m, angled socket | X24 | 91.4200.43 |
| • Filling level sensor, transm. connection | 0.7 m, angled socket | X25 | 91.4200.44 |
| • Disable connection to FSM-137 / FS-16/18 / TD-16 | 3.0 m | X21 | 91.4280.01 |
| • Mains supply line | 3.0 m, with Schuko plug | X10 | 91.4290.01 |
| • Mains supply line | 3.0 m, open end of line | X10 | 91.4290.02 |